

03495206
SEQUENCE LISTING

<110> BOURSAUX-EUDE, CAROLINE
GUIISO-MACLOUF, NICOLE

<120> POLYPEPTIDES CONTAINING POLYMORPHISMS OF THE REPEATED
REGIONS OF PERTACTIN IN BORDETELLA PERTUSSIS,
BORDETELLA PARAPERTUSSIS, AND BORDETELLA
BRONCHISEPTICA, THEIR USE IN DIAGNOSTICS, AND IN
IMMUNOGENIC COMPOSITIONS

<130> 03495-0206-00000

<140> 09/855,754

<141> 2001-05-16

<150> 60/206,969

<151> 2000-05-25

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<170> PatentIn Ver. 2.1

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<213> Bordetella pertussis

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185

190

Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Arg Asp Thr Asn Val
 195 200 205

Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Ser Val Leu Gly
 210 215 220

Ala Ser Glu Leu Thr Leu Asp Gly Gly His Ile Thr Gly Gly Arg Ala
 225 230 235 240

Ala Gly Val Ala Ala Met Gln Gly Ala Val Val His Leu Gln Arg Ala
 245 250 255

Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly
 260 265 270

Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe
 275 280 285

Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Ser
 290 295 300

Val Glu Leu Ala Gln Ser Ile Val Glu Ala Pro Glu Leu Gly Ala Ala
 305 310 315 320

Ile Arg Val Gly Arg Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu
 325 330 335

Ser Ala Pro His Gly Asn Val Ile Glu Thr Gly Gly Ala Arg Arg Phe
 340 345 350

Ala Pro Gln Ala Ala Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala His
 355 360 365

Ala Gln Gly Lys Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys
 370 375 380

Leu Thr Leu Thr Gly Gly Ala Asp Ala Gln Gly Asp Ile Val Ala Thr
 385 390 395 400

Glu Leu Pro Ser Ile Pro Gly Thr Ser Ile Gly Pro Leu Asp Val Ala
 405 410 415

Leu Ala Ser Gln Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser
 420 425 430

Leu Ser Ile Asp Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val
 435 440 445

Gly Ala Leu Arg Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro
 450 455 460

Ala Glu Ala Gly Arg Phe Lys Val Leu Thr Val Asn Thr Leu Ala Gly
 465 470 475 480

Ser Gly Leu Phe Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp
 485 490 495

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Lys Leu Val Val Met Gln Asp Ala Ser Gly Gln His Arg Leu Trp Val
500 505 510

Arg Asn Ser Gly Ser Glu Pro Ala Ser Ala Asn Thr Leu Leu Leu Val
515 520 525

Gln Thr Pro Arg Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp
530 535 540

Gly Lys Val Asp Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly
545 550 555 560

Asn Gly Gln Trp Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys
565 570 575

Pro Ala Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln
580 585 590

Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
595 600 605

Ala Ala Asn Ala Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr
610 615 620

Leu Trp Tyr Ala Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu
625 630 635 640

Arg Leu Asn Pro Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln
645 650 655

Arg Gln Gln Leu Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val
660 665 670

Ala Gly Phe Glu Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly
675 680 685

Arg Trp His Leu Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly
690 695 700

Phe Thr Gly Asp Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly
705 710 715 720

Tyr Ala Thr Tyr Ile Ala Asp Ser Gly Phe Tyr Leu Asp Ala Thr Leu
725 730 735

Arg Ala Ser Arg Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly
740 745 750

Tyr Ala Val Lys Gly Lys Tyr Arg Thr His Gly Val Gly Ala Ser Leu
755 760 765

Glu Ala Gly Arg Arg Phe Thr His Ala Asp Gly Trp Phe Leu Glu Pro
770 775 780

Gln Ala Glu Leu Ala Val Phe Arg Ala Gly Gly Gly Ala Tyr Arg Ala
785 790 795 800

Ala Asn Gly Leu Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly
805 810 815

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Arg Leu Gly Leu Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg
820 825 830

Gln Val Gln Pro Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly
835 840 845

Ala Gly Thr Val His Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg
850 855 860

Gly Thr Arg Ala Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg
865 870 875 880

Gly His Ser Leu Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu
885 890 895

Ala Met Pro Trp Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
900 905 910

<210> 6

<211> 922

<212> PRT

<213> Bordetella parapertussis

<400> 6

Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg
1 5 10 15

Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala
20 25 30

Tyr Ala Asp Trp Asn Asn Gln Ser Ile Ile Lys Ala Gly Glu Arg Gln
35 40 45

His Gly Ile His Ile Lys Gln Ser Asp Gly Ala Gly Val Arg Thr Ala
50 55 60

Thr Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Val Leu
65 70 75 80

Leu Glu Asn Pro Ala Ala Glu Leu Arg Phe Gln Asn Gly Ser Val Thr
85 90 95

Ser Ser Gly Gln Leu Phe Asp Glu Gly Val Arg Arg Phe Leu Gly Thr
100 105 110

Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala
115 120 125

Asn Val Ser Asp Thr Arg Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala
130 135 140

Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala
145 150 155 160

Gly Gly Val Arg Val Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
165 170 175

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Thr Ile Val Asp Gly Gly Leu His Ile Gly Thr Leu Gln Pro Leu Gln
180 185 190

Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Gly Asp Thr Ser Val
195 200 205

Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Phe Val Phe Gly
210 215 220

Ala Asn Glu Leu Thr Val Asp Gly Gly His Ile Thr Gly Gly Arg Ala
225 230 235 240

Ala Gly Val Ala Ala Met Asp Gly Ala Ile Val His Leu Gln Arg Ala
245 250 255

Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly
260 265 270

Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp
275 280 285

Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
290 295 300

Ser Ile Val Glu Ala Pro Gln Leu Gly Ala Ala Ile Arg Ala Gly Arg
305 310 315 320

Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu Ser Ala Pro His Gly
325 330 335

Asn Val Ile Glu Thr Gly Gly Gly Ala Arg Arg Phe Pro Pro Pro Ala
340 345 350

Ser Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala Arg Ala Gln Gly Arg
355 360 365

Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys Leu Thr Leu Ala
370 375 380

Gly Gly Ala Gln Gly Gln Gly Asp Ile Val Ala Thr Glu Leu Pro Pro
385 390 395 400

Ile Pro Gly Ala Ser Ser Gly Pro Leu Asp Val Ala Leu Ala Ser Gln
405 410 415

Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser Leu Ser Ile Asp
420 425 430

Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val Gly Ala Leu Arg
435 440 445

Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro Ala Glu Ala Gly
450 455 460

Arg Phe Lys Val Leu Met Val Asp Thr Leu Ala Gly Ser Gly Leu Phe
465 470 475 480

Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp Lys Leu Val Val
485 490 495

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Met Arg Asp Ala Ser Gly Gln His Arg Leu Trp Val Arg Asn Ser Gly
500 505 510

Ser Glu Pro Ala Ser Gly Asn Thr Met Leu Leu Val Gln Thr Pro Arg
515 520 525

Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp Gly Lys Val Asp
530 535 540

Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly Asn Gly Gln Trp
545 550 555 560

Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln
565 570 575

Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
580 585 590

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro
595 600 605

Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala Ala Asn Ala
610 615 620

Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr Leu Trp Tyr Ala
625 630 635 640

Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu Arg Leu Asn Pro
645 650 655

Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln Arg Gln Gln Leu
660 665 670

Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val Ala Gly Phe Glu
675 680 685

Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly Arg Trp His Leu
690 695 700

Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly Phe Thr Gly Asp
705 710 715 720

Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly Tyr Ala Thr Tyr
725 730 735

Ile Ala Asn Ser Gly Phe Tyr Leu Asp Ala Thr Leu Arg Ala Ser Arg
740 745 750

Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly Tyr Ala Val Lys
755 760 765

Gly Lys Tyr Arg Thr His Gly Val Gly Val Ser Leu Glu Ala Gly Arg
770 775 780

Arg Phe Ala His Ala Asp Gly Trp Phe Leu Glu Pro Gln Ala Glu Leu
785 790 795 800

Ala Val Phe Arg Val Gly Gly Gly Ala Tyr Arg Ala Ala Asn Gly Leu

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805

810

815

Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly Arg Leu Gly Leu
820 825 830

Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg Gln Val Gln Pro
835 840 845

Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly Ala Gly Thr Val
850 855 860

Arg Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg Gly Thr Arg Ala
865 870 875 880

Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg Gly His Ser Leu
885 890 895

Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu Ala Met Pro Trp
900 905 910

Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
915 920

<210> 7

<211> 51

<212> PRT

<213> Bordetella bronchiseptica

<400> 7

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15

Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
20 25 30

Leu Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp
35 40 45

Leu Ala Gln
50

<210> 8

<211> 46

<212> PRT

<213> Bordetella bronchiseptica

<400> 8

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp Gly Trp
20 25 30

Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
35 40 45

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<210> 9
 <211> 56
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 9
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Gly Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Phe Asp Pro Gly Gly Phe Gly Pro
 20 25 30
 Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
 35 40 45
 Gly Ser Thr Val Glu Leu Ala Gln
 50 55

<210> 10
 <211> 56
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 10
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
 20 25 30
 Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
 35 40 45
 Gly Ser Ser Val Glu Leu Ala Gln
 50 55

<210> 11
 <211> 61
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 11
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
 20 25 30
 Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr
 35 40 45
 Gly Val Asp Val Ser Gly Ser Ser Val Glu Leu Ala Gln
 50 55 60

<210> 12
 <211> 56

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<212> PRT

<213> Bordetella bronchiseptica

<400> 12

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
 20 25 30

Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
 35 40 45

Gly Ser Ser Val Glu Leu Ala Gln
 50 55

<210> 13

<211> 51

<212> PRT

<213> Bordetella bronchiseptica

<400> 13

Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
 20 25 30

Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Gly Ser Ser Val Glu
 35 40 45

Leu Ala Gln
 50

<210> 14

<211> 49

<212> PRT

<213> Bordetella bronchiseptica

<400> 14

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln
 20 25 30

Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
 35 40 45

Ala

<210> 15

<211> 52

<212> PRT

<213> Bordetella bronchiseptica

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<400> 15

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
 20 25 30

Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
 35 40 45

Leu Ser Ala Ala
 50

<210> 16

<211> 59

<212> PRT

<213> Bordetella bronchiseptica

<400> 16

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln
 20 25 30

Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Pro Glu Ala Pro Ala Pro
 35 40 45

Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 50 55

<210> 17

<211> 52

<212> PRT

<213> Bordetella bronchiseptica

<400> 17

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
 20 25 30

Pro Gln Arg Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
 35 40 45

Leu Ser Ala Ala
 50

<210> 18

<211> 56

<212> PRT

<213> Bordetella bronchiseptica

<400> 18

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Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
 20 25 30

Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro
 35 40 45

Ala Gly Arg Glu Leu Ser Ala Ala
 50 55

<210> 19

<211> 58

<212> PRT

<213> Bordetella bronchiseptica

<400> 19

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
 20 25 30

Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln
 35 40 45

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 50 55

<210> 20

<211> 48

<212> PRT

<213> Bordetella bronchiseptica

<400> 20

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro
 20 25 30

Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 35 40 45

<210> 21

<211> 52

<212> PRT

<213> Bordetella bronchiseptica

<400> 21

Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
 20 25 30

Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
35 40 45

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<210> 22
<211> 54
<212> PRT
<213> Bordetella bronchiseptica
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<400> 22
Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
20 25 30

Gln Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly
 35 40 45

Arg Glu Leu Ser Ala Ala
50

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<210> 23
<211> 42
<212> FRT
<213> Bordetella bronchiseptica
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<400> 23
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln
20 25 30

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
35 40

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<210> 24
<211> 39
<212> PRT
<213> Bordetella bronchiseptica
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<400> 24
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1 5 10 15

Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala
20 25 30

Gly Arg Glu Leu Ser Ala Ala
35

<210> 25

03495206

<211> 5
<212> PRT
<213> Artificial

<220>
<221> MISC_FEATURE
<222> (3)..(4)
<223> Xaa can be any amino acid

<400> 25
Gly Gly Xaa Xaa Pro
1 5

CB
conc.